

This listing of claims will replace all prior versions, and listing of claims in this application:

In the Claims:

1-56. (cancelled)

57. (Currently Amended) A combination of ingredients forming a retroreflective ink, the combination comprising metallised retroreflective elements, microbeads additional to said retroreflective elements and/or constituting said retroreflective elements at least in part, a binder chemicals chemical for attaching the retroreflective elements and microbeads to a substrate to which the ink is to be applied, the binder chemical being a polyvinylidene chloride co-polymer, a coupling agent for coupling the microbeads and cross-linking the binder chemicals chemical, the coupling agent being a mixture of an aminoalkyl silanetriol and a blocked hexamethylene diisocyanate trimer, and a buffer, the coupling agent being unreactive and uncured until a curing step is carried out and reactive when the curing step is carried out during which a temperature of the substrate and ink applied to the substrate is elevated to between 60 and 200°C, the coupling agent having a storage life of not less than about 3 months and being unreactive except at elevated temperature of the curing step, the coupling agent being selected from the group consisting of an aminoalkyl silanetriol and a blocked polyisocyanate.

58. (Cancelled)

59. (Previously Presented) The combination of claim 57 wherein at least some of the microbeads are without the retroreflective elements.

60. (Cancelled)

61. (Previously Presented) The combination of claim 57 further comprising one or more components selected from the group consisting of:

pigment, dispersant, defoamer, thickening agent, cross-linking agent, softening agent, carbon black, UV absorbing material, anti-scuffing agent, a silicone or fluoropolymer,

light spill-suppressing agent, anti-static agent, water repellent agent, a silicone, and a fluoropolymer.

62. (Previously Presented) The combination of claim 57 wherein the volume ratio of the binder to the microbeads is equal to or less than 50%.

63. (Previously Presented) The combination of claim 57 wherein essentially all of the microbeads are unmetallised and the retroreflective elements include reflective flake particles.

64. (Previously Presented) The combination of claim 57 wherein the binder forms at least part of a liquid carrier medium for the retroreflective elements or microbeads.

65. (Previously Presented) The combination of claim 57 wherein the binder chemicals, retroreflective elements and microbeads are comprised of a one-pack retroreflective ink or a two-pack retroreflective ink having the coupling agent as the second pack.

66. (Previously Presented) The combination of claim 65 wherein the two-pack ink includes a reactive polyisocyanate or an alkoxy silyl alkyl derivative.

67. (Previously Presented) The combination of claim 57 wherein the microbeads are metallised with an aluminium coating that is superposed on a stannous chloride pre-treatment.

68. (Previously Presented) The combination of claim 67 wherein the metallised microbeads are treated with a solution of a silicate, followed by treatment with a silane.

69. (Previously Presented) The combination of claim 67 wherein the metallised microbeads are treated with an amino silane.

70. (Previously Presented) A composition that is one-pack or a two-pack retroreflective ink which is comprised of the combination claimed in claim 57.

71. (Previously Presented) The composition of claim 70 wherein the retroreflective ink is water-based.

72. (Previously Presented) The composition of claim 71 that is suitably formulated for screen printing.

73. (Previously Presented) The composition of claim 70 wherein the ink has a viscosity that is less than or equal to about 40 Pascal seconds at room temperature.

74-80 (Cancelled)

81. (Currently Amended) A method for making a one-pack retroreflective ink comprising the steps of:

- (a) making metallised microbeads;
- (b) suspending the microbeads in a liquid carrier medium, the liquid carrier medium is comprised of a binder chemicals chemical for attaching the microbeads to a substrate to which the ink is to be applied, the binder chemical being a polyvinylidene chloride copolymer, a coupling agent which couples the microbeads and cross-links the binder chemicals chemical, the coupling agent being an aminoalkyl silanetriol and a blocked hexamethylene diisocyanate trimer, and a buffer, the one-pack retroreflective ink having a storage life of not less than about 3 months and the coupling agent being unreactive and uncured until a curing step is carried out and reactive when the curing step is carried out during which a temperature of the substrate and ink applied to the substrate is elevated to between 60 and 200°C, the coupling agent having a storage life of not less than about 3 months and being unreactive except at elevated temperature of the curing step, the coupling agent being selected from the group consisting of an aminoalkyl silanetriol and a blocked polyisocyanate.

82. (Previously Presented) The method of claim 81 wherein step (a) includes applying an aluminium coating to the microbeads.

83. (Previously Presented) The method of claim 82 wherein step (a) includes pre-treating the microbeads with stannous chloride prior to application of the aluminium coating.

84. (Previously Presented) The method of claim 83 wherein step (a) includes treating the microbeads with a dilute aqueous solution of stannous chloride.

85. (Previously Presented) The method of claim 81 wherein step (a) includes hemispherically metallising the microbeads in a vacuum metallising process in which the microbeads are held on a film with an adhesive coating for transport through the metallising process, the adhesive coating is comprised of styrene-butadiene type adhesive.

86. (Previously Presented) The method according to claim 85, wherein step (a) includes passing the film through an aqueous solution of citric acid after metallisation.

87. (Previously Presented) The method of claim 85 wherein step (a) includes ultrasonically treating the film to assist in release of the microbeads from the adhesive.

88. (Previously Presented) The method of claim 84 wherein step (a) includes treating the microbeads prior to inclusion in the ink with a silicate.

89. (Previously Presented) The method of claim 81 wherein step (a) includes treating the microbeads with a silane or an amino silane prior to inclusion in the ink.

90. (Previously Presented) The method of claim 88 wherein step (a) includes treating the microbeads with an amino silane after the silicate treatment.

91. (Cancelled)

92. (Previously Presented) The method of claim 81 wherein step (b) includes preparing the liquid carrier medium from the binder chemicals and the coupling agent before suspending the microbeads in the liquid carrier medium.

93. (Previously Presented) The method of claim 92 wherein the liquid carrier medium of step (b) includes additives selected from the group consisting of:

pigment, dispersant, defoamer, thickening agent, cross-linking agent, softening agent, carbon black, UV absorbing material, anti-scuffing agent, silicone, fluoropolymer, light spill-suppressing agent, anti-static agent and water repellent agent.

94. (Previously Presented) The method of claim 93 wherein step (b) includes adding a thickener to the liquid carrier medium before or after the addition of the binder chemicals and coupling agent.

95. (Previously Presented) A composition of an ink produced by the method of claim 81.

96. (Previously Presented) A composition of a substrate coated or printed with a composition of claim 95.

97. (Previously Presented) The composition of claim 96 wherein the substrate is a screen for displaying projected images or a studio background for chroma-keying applications.

98. (Previously Presented) The composition of claim 96 wherein the substrate is a flexible tape.

99. (Previously Presented) The method of providing a substrate having a retroreflective coating, comprising the steps of:

applying to the substrate an ink as claimed in claim 95 wherein the ink is formulated as a one-pack retroreflective ink and the coupling agent is activated after the ink is printed or coated on to the substrate.

100. (Previously Presented) The method of claim 99 wherein the coupling agent is activated by curing the ink coating at elevated temperature.

101. (Previously Presented) The method of claim 99 wherein the coupling agent is activated by UV light or other high energy radiation during or after the printing process.

102. (Previously Presented) The composition of claim 95 wherein the ink is a retroreflective one-pack ink having a storage life of not less than about 3 months.

103. (Previously Presented) The composition of claim 102 wherein the retroreflective one-pack ink has a viscosity of between about 10 and 30 Pascal seconds after storage of not less than about 3 months.

104. (Previously Presented) The composition of claim 102 wherein the retroreflective one-pack ink applied to the substrate and cured has a laundering durability such that the retroreflectivity is not reduced by more than about 40% when the substrate is in the form of a cotton, nylon or polyester fabric and laundered for 5 cycles in accordance with ISO 6330, method 5A.

105-112. (Cancelled)

113. (Previously Presented) The composition of claim 57, wherein the coupling agent has a storage life of not less than about 3 months and is unreactive except at elevated temperature of between 130 and 180°C at which the one-pack retroreflective ink printed on the substrate is cured.

114. (Previously Presented) The method of claim 81, wherein the coupling agent has a storage life of not less than about 3 months and is unreactive except at elevated temperature of between 130 and 180°C at which the one-pack retroreflective ink printed on the substrate is cured.

115. (Previously Presented) The combination of claim 68 wherein the microbeads have at least one of the following characteristics selected from the group consisting of: a refractive index in the range of about 1.8 to 2.2, a median size of the microbeads in the range of about 10 to 100 microns and the microbeads are composed of titanium glass or barium glass.

116. (Previously Presented) The method of claim 90 wherein the microbeads have at least one of the following characteristics selected from the group consisting of: a refractive index in the range of about 1.8 to 22., a median size of the microbeads in the range of about 10 to 100 microns and the microbeads are composed of titanium glass or barium glass.

117. (Currently Amended) A combination of ingredients forming a retroreflective ink, the combination comprising retroreflective elements, microbeads additional to said retroreflective elements and/or constituting said retroreflective elements at least in part, a binder chemicals chemical for attaching the retroreflective elements and microbeads to a substrate to which the ink is to be applied, the binder chemical being a polyvinylidene chloride co-polymer, and a coupling agent for coupling the microbeads and cross-linking the binder chemicals chemical, the coupling agent being a mixture of an aminoalkyl silanetriol and a blocked hexamethylene diisocyanate trimer and being unreactive and uncured until a curing step is carried out and reactive when the curing step is carried out during which a temperature of the substrate and ink applied to the substrate is elevated to between 60 and 200°C, the coupling agent having a storage life of not less than about 3 months and being unreactive except at elevated temperature of the curing step, ~~the coupling agent being selected from a group consisting of an aminoalkyl silanetriol and a combination of aminoalkyl silanetriol and blocked polyisocyanate and wherein the ink retains a viscosity of between 10 and 30 Pascal seconds for not less than 3 months.~~

118. (Currently Amended) A method for making a one-pack retroreflective ink comprising the steps of:

- (a) making metallised microbeads;
- (b) suspending the microbeads in a liquid carrier medium, the liquid carrier medium is comprised of a binder chemicals chemical for attaching the microbeads to a substrate to

which the ink is to be applied, the binder chemical being a polyvinylidene chloride co-polymer, and a coupling agent which couples the microbeads and cross-links the binder chemicals chemical, the coupling agent being a mixture of an aminoalkyl silanetriol and a blocked hexamethylene diisocyanate trimer, the one-pack retroreflective ink having a storage life of not less than about 3 months and the coupling agent being unreactive and uncured until a curing step is carried out and reactive when the curing step is carried out during which a temperature of the substrate and ink applied to the substrate is elevated to between 60 and 200°C, the coupling agent having a storage life of not less than about 3 months and being unreactive except at elevated temperature of the curing step, ~~the coupling agent being selected from a group consisting of an aminoalkyl silanetriol and a combination of aminoalkyl silanetriol and block polyisocyanate; and~~

wherein the ink retains a viscosity of between 10 and 30 Pascal seconds for not less than 3 months.

119. (Previously Presented) The combination of ingredients according to claim 57 wherein the buffer is a phosphate buffer.

120. (Previously Presented) The combination of ingredients according to claim 119 wherein the phosphate buffer is an ammonium phosphate buffer.

121. (Previously Presented) The combination of ingredients according to claim 119 wherein the phosphate buffer is a sodium phosphate buffer.

122-127. (Cancelled)

128. (Previously Presented) The combination of ingredients according to claim 57 additionally including a humectant.

129. (Previously Presented) The combination of ingredients according to claim 128 wherein the humectant is urea.

130. (Previously Presented) The combination of ingredients according to claim 128 wherein the humectant is a combination of urea and 2,3 propane diol.

131. (Previously Presented) The combination of claim 57 wherein the combination comprises a one pack retroreflective ink.

132. (Previously Presented) The composition of claim 70 wherein the ink has a viscosity of between 10 and 30 Pascal seconds at room temperature.

133. (Previously Presented) The method of claim 81 wherein the liquid carrier medium of step (b) includes a phosphate buffer.

134. (Previously Presented) The method of claim 133 wherein the phosphate buffer is an ammonium phosphate buffer.

135. (Previously Presented) The method of claim 133 wherein the phosphate buffer is a sodium phosphate buffer.

136. (Previously Presented) The method of claim 81 wherein the liquid carrier medium of step (b) additionally includes a humectant.

137. (Previously Presented) The method of claim 136 wherein the humectant is urea.

138. (Previously Presented) The method of claim 136 wherein the humectant is a combination of urea and 2,3 propane diol.

139-141. (Cancelled)